

(3) Narrative Proposal

(a) **Work Plan**

(i) **Project Summary**

(1) **Organization and Partnerships**

(a) Troy University will serve as the managing organization and applicant of this project. Troy University is a public university in Troy, Alabama; DUNS: 072059038

(b) Key personnel responsible for implementing and managing the project include: Brian Helms, PhD. Department of Biological and Environmental Sciences, Troy University, helmsb@troy.edu; Department of Biological and Environmental Sciences, Troy University; Key personnel will be supported by multiple faculty, staff, and graduate students in mentorship and supporting roles..

(c) Local schools from Pike, Barbour, Bullock, Montgomery and surrounding counties will be contacted for collaboration if funded. Established partners such as AL Science in Motion, AL Water Watch, and AL Extension will also be contacted for implementation.

(2) **History of Receiving EE grants** – Troy University is not currently receiving funding for this proposed project from the EPA EE Grant Program, nor has it previously received funding for this project.

(3) **Goals and Objectives** – The goal of this project is to determine how direct, individualized mentorship of young potential community leaders increases community environmental awareness, knowledge, and involvement in rural and urban underrepresented populations. By pursuing this question, we will promote environmental and conservation stewardship in underrepresented communities through the implementation of local environmental actions, practices, and projects. The specific objectives are to **1)** create and implement a localized environmental curriculum model and mentor 18 high school juniors (“fellows”) on general and localized environmental issues; **2)** host an intensive two-week residential fellow summer camp where students gain hands on problem solving and teaching experiences; **3)** implement high school environmental projects; **4)** facilitate knowledge transfer to community.

These objectives meet the definition of environmental education in that **Stewardship** will be fostered through a mentorship chain that includes increasing **Awareness** and **Knowledge** (Objective 1: localized curriculum), **Critical Thinking** (Objective 1: identifying local issues, sources, and potential solutions), **Problem Solving** by designing an achievable solution to a local environmental issue (Objective 2), **Decision Making** by designing and building their solution (Objective 2 and Objective 3), **Action** by building and implementing a local environmental project (Objective 3) and communicating environmental principles (Objective 2 and 4), and ultimately **Stewardship** by serving as a community leader in environmental issues. We intend to 1) “build” community leaders in environmental awareness; 2) provide tools to solve environmental issues 3) increase environmental competency in underrepresented populations.

(4) **Priorities** – this project will address many of the Educational and Environmental Priorities of the EPA through focused mentorship, education and outreach, skill development, and the implementation of focused student community projects. The relative emphasis of each priority will be driven in the direction of focused student projects. The primary Educational Priority that the project will focus on is **Priority 3**, although depending on the direction of student projects, other Priorities will likely be addressed. We anticipate **Environmental Priorities 2- 4** to be addressed across the activities of the project.

(a) **Educational Priorities:**

Priority 3 – Career Development by educating students on how to teach about environmental and conservation issues, solutions and stewardship to encourage interest in environmental fields.

(b) **Environmental Priorities:**

Priority 2 – Ensuring clean and safe water.

- a. Work collaboratively to prevent future water quality and human health issues through appropriate management for flood and hurricane preparedness.
- b. Work collaboratively to participate in the conservation of quality water resources
- c. Work collaboratively to manage nutrients in water systems by reducing the use of pesticides and/or nutrient run-off from soil, while maintaining both quality agricultural yields and minimal environmental harm.
- d. Work collaboratively to manage the health of aquatic ecosystems to achieve the maximum in environmental and human health benefits and support recreational, economic, and subsistence activities.

Priority 3 – Ensuring safety of chemicals

- a. Work collaboratively on Integrated Pest Management (IPM) to achieve the most environmentally effective management of pests in the **residential / community** setting.
- b. Work collaboratively on Integrated Vegetation Management issues for the maximum in environmental benefits.

Priority 4 – Increase transparency, public participation, and collaboration with communities

- a. Work collaboratively to educate school-aged children, their parents, and the community on food issues as related to environmental health issues.
- b. Work collaboratively to manage waste for environmental benefits.

(5) **Local Relevance** – This project will take place in southeastern Alabama, primarily in the rural and urban areas associated with the Black Belt (Fig. 1). Alabama contains some of the richest natural resources and biodiversity of any geopolitical unit in the world. For example, no place on earth has a more diverse fauna of freshwater fishes, mussels, snails, crayfishes, and caddisflies than AL, and the state contains the highest diversity of amphibians, and reptiles, and mollusks east of the Mississippi River. Correspondingly, Alabama also has the greatest proportion of federally listed endangered species in the Southeast. For example, the Coosa River system historically supported a diverse mussel and snail fauna that has been severely impacted in the last 100 years by impoundments and landscape alteration. Considerable work has been conducted documenting incredible levels of taxonomic richness and associated drivers of imperilment for major metazoan groups, with habitat degradation and impaired environmental quality regarded as major underlying factors (Boschung and Mayden 2004; Guyer et al. 2015; Johnson et al. 2013; Lydeard and Mayden 1995; Schuster et al. 2008; Williams et al. 2008; Warren et al. 2000; Taylor et al. 2007).

Despite its leading role in harboring biodiversity, Alabama is also low ranking in student achievement and general environmental awareness. Recently, Alabama ranked 48th in the US on the National Assessment of Education Progress science test (NAEP 2011). Similarly, Alabama students score low on the ACT, with an average score of 20.1 and a ranking of 41st in the nation in 2011 (NAEP 2011). In terms of environmental health and awareness, Alabama also generally is near the bottom of state rankings in many formal and informal polls (e.g., NAEP 2017). Further, there is a high proportion of the Alabama populace that is comprised of underrepresented minorities in STEM education, particularly African American (27%, US Census Bureau, 2015). There is also a well-documented dearth of minority representation in natural resource professions (Adams and Moreno 1998, Davis et al. 2002). Interestingly, a recent study shows that

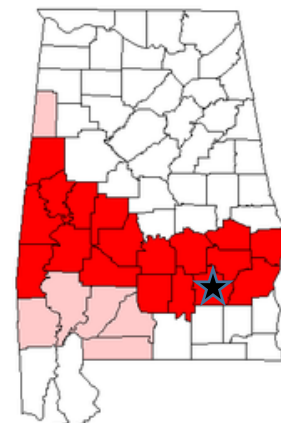


Fig. 1. The Black Belt counties of AL (red are historical, pink are frequently included). Troy University is denoted by star.

the most prominent contextual barrier for careers in natural resource faced by underrepresented minorities is experiential and social factors; i.e., positive exposures to nature and influential mentors (Haynes et al. 2015). Within Alabama, the Black Belt region comprises roughly 17 counties notably underserved with high poverty, little economic opportunities, high unemployment, and limited access to services and education. Thus, there is a critical need for advances in education, awareness of the globally-relevant natural heritage of this region, and job skills among youth in this area.

(6) Implementation/Delivery Method

- (a) Our audience will be reached through online classes, in-class visits from mentors, workshops, and one-on-one and small group mentoring, in situ experiential training, field trips, and interactive day camps.
- (b) Sub-grants will be disbursed to the home school of each fellow. These funds will be used to help implement fellows' local environmental project after the summer experience (i.e., Decision Making, Action). These awards will be ~ \$4000 each.

(7) Audience

- (a) The project will primarily target students (18 - 11th/12th grade Fellows, 25 - 6th/7th grade summer day campers). The project will secondarily target students (300 - 10th, 11th and 12th grade) and local communities (100's of individuals) in general through the implementation of focused projects.
 - (b) The project will be focused on schools from the Black Belt region of Alabama. Target schools will be from Pike, Barbour, Bullock, Montgomery, and surrounding counties. This area has a high proportion of African Americans, includes both heavily rural and urban areas, and is one of the most underserved regions of the US as a result of longstanding poverty, unemployment, and racial disparity.
- (8) Costs** – The main costs for this project include 1) personnel wages for mentors and project/camp managers, 2) travel, 3) materials for residential and day camps, and 4) sub-grants to the schools of participating Fellows.

(ii) Detailed project description

(1) What The American model for scientific education has remained virtually unchanged for the past 100+ years. The traditional didactic model, though valid for some students, often leaves many students disenfranchised because they are not observing first-hand phenomena, and instead are presented an abstraction of a concept of which they cannot personally relate. Through an informal environmental mentoring initiative, we will allow students to exercise their creativity by guiding place-based environmental problem-solving design, solution implementation, and interpretation. Through these efforts, we will inspire a love of environmental learning that will motivate future community leaders participating in this program to continue to pursue STEM careers. Additionally, this program would allow current Troy University science majors to mentor and facilitate students in middle and high schools, thus preparing them for careers in STEM fields in academia or industry.

The Deep South Student Leadership and Environmental Action Program (LEAP) will identify 11th graders from 6 schools (3 students per school, 18 students total) via an environmental outreach tour of Alabama Black Belt high schools during the fall season. During this outreach event, conducted by Troy University faculty, lecturers, graduate and undergraduate students, 11th graders will be presented a variety of environmentally- themed educational material and potential career paths. Additionally, we will arrange meetings with STEM teachers, particularly those teaching Environmental Science, in each school to discuss project goals and school needs/interests. From these school visits, 3 students (Fellows) in each of 6 schools will be identified to partake in an environmental mentorship program. This mentorship program will take place during March, April, and May of the spring and consist of bi-weekly individual and group meetings and correspondences with an environmental mentor and

undergraduate liaison. The environmental mentor will be a Troy University faculty, lecturer, or graduate student and the environmental liaison will be a Troy University undergraduate in the Environmental Club. During this mentorship, mentors, liaisons, and Fellows will identify a local, manageable environmental issue and an associated means to address the issue (i.e., a “solution”), students will develop an associated short proposal and budget to be reviewed by the mentor team. Each school will be disbursed ~\$2,000 as a sub-award during the spring to initiate any necessary preliminary work for the project.

During the summer, all 18 fellows from the 6 schools will come to Troy University for a 2-week residential summer camp. This will be an immersion –type experience where Fellows will experience hands-on approaches to environmental issues. Days will be spent with group activities such as environmental monitoring techniques, gardening and composting, invasive species management, etc. Time will also be devoted to activities targeted directly to honing skills needed to implement group projects, with the intent of developing a beta-version of each group project. During the second week of camp, Fellows will rotate in and out of a concurrent 5th/6th grade middle-school day camp, also to be held at Troy University. The day camp will focus on age-appropriate activities and content such as recycling games, composting, day trips to view/collect insects, fish, plants, etc. Fellows will be challenged with designing and presenting environmental education concepts and material based on their experiences to these young campers.

Following a pre-school meeting to refresh summer ideas, Fellows (now seniors in their school) will work to implement their project idea during the fall. This will be facilitated with another sub-award of ~\$2000 (\$4,167 average). Fellows will be responsible for recruiting assistance from their peers and raising additional necessary in-kind support and/or capital for projects, although effort will be maximized to keep projects at or below \$4000. Fellows will be responsible for interpreting their project to the school and community. A reunion and presentation ceremony of the community projects will be held during the following spring.

- (a) This project will primarily address one of EPAs Educational Priorities, however additional priorities may be addressed. The degree to which additional priorities are addressed will depend largely on the nature and direction of student group projects. Since student group projects will be action-oriented with an emphasis on skill-building, student background, interest, and local need will drive these activities. The main priority of this project is **Priority 3**, “educating students on how to teach about environmental and conservation issues, solutions and stewardship to encourage interest in environmental fields”. This will be addressed by educating fellows on relevant environmental issues through readings and direct mentorship; environmental issue identification and problem solving approaches; direct training and experience in communicating environmental science concepts and examples; leading teaching modules at youth summer day camp and interpreting their individual projects at their home institutions. The skills obtained from this experience will help build student confidence in preparation for college, community involvement, and expose them to ideas and approaches appropriate for a career in Environmental Science and/or teaching.
- (b) To address EPA Environmental Priorities, this project will work directly with Fellows, their teachers, and elementary-school youth to increase awareness and provide potential solutions to problematic issues surrounding air quality, water quality/abundance, chemical safety, and community collaboration. Much like Educational Priorities, the exact nature of the Environmental Priorities addressed by this broader effort will be driven by Fellow group projects. For example, initiating a citizen-based air quality monitoring using hand-held air quality monitors and/or diffusion tubes in inner-city locations near Montgomery schools would directly address **Priority 1 – Improving air quality**. Similarly, starting a local watershed

monitoring program and linking input to a recognized citizen science network and database such as Alabama Water Watch (alabamawaterwatch.org) would directly address **Priority 2 – Ensuring clean and safe water** by participating in conservation and management of aquatic ecosystems. Beyond water quality, invasive species management is a particularly challenging issue in south Alabama. Community projects aimed at controlling invasive species with a IPM approach from targeted areas such as public parks and significant natural areas along with interpretation of these actions will address **Priority 3 – Ensuring safety of chemicals** by collaborative work on Integrated Vegetation Management issues for the maximum in environmental benefits. Initiating a community garden and school composting program would directly address **Priority 4 – Increase transparency, public participation, and collaboration with communities** by working collaboratively to manage food waste for environmental benefits. Additionally, all projects implemented, as well as the Fellow teaching activities associated with summer camp, would directly address **Priority 4** especially when children are involved, because their parents, family, and neighbors would be more willing to participate.

(2) Why

- (a) Two of the foremost gaps in environmental science education is broadening participation and connecting across different settings. For the citizens of Alabama, this is no exception. In terms of environmental health and awareness, Alabama generally is near the bottom of state rankings in many formal and informal polls. Within Alabama the Black Belt region, which extends in a crescent shape across the mid-section of the state, comprises the most impoverished areas of the state as well as being the subject of racial and environmental injustice claims (e.g., coal ash spill dumps in Uniontown, Perry County). Two avenues to help alleviate these environmental education gaps is increasing participation in community environmental programs facilitated through direct mentorship and experiential learning of young community leaders. Community-based environmental projects include a diversity of activities that commonly involve the lay public in the participation of implementation, monitoring or research. These efforts generally are often two-fold, serving both to generate scientifically-relevant data and educate participants (Cooper et al. 2007). Recent research however has found that community and citizen science activities often have minimal impact on environmental and scientific attitudes or understanding (Brossard et al. 2005). Clear articulation of broad project goals, the specific methodology, and a scientific approach to inquiry in general is integral to public understanding of environmental problem-solving, yet these details are not always sufficiently provided in the community project or citizen science context (Brossard et al. 2005). We propose to fill this gap by training young environmental scientists to have the ability to not only identify and problem-solve local environmental issues but arm them with skills and experiences to articulate the importance of addressing these issues.
- (b) The particular priorities that we have chosen are **Education Priority #3** and **Environmental Priorities 2-4**. The Education priority was selected because career development is a fundamental need in the AL Black Belt. Increased job opportunities, along with increased environmental knowledge, can help alleviate environmental issues that have plagued the region. The Environmental Priorities selected reflect the basic environmental needs associated with the area. For example, drinking water samples in the area do not uniformly meet state and/or federal guidelines, and there are clear associations with water system supply issues and gastrointestinal illnesses (Stauber et al. 2016). Also, invasive species are rampant in riparian corridors of Alabama (Atasoy et al. 2018), with broad scale control difficult and advances on this front firmly planted in knowledge and prevention.

(3) **How**

- (a) Educational **Priority #3** will be reached by providing Fellows located in the AL Black Belt direct career development in environmental education, conservation, stewardship, and/or natural resource fields. This will involve fostering role model relationships with mentors, experiential learning and gaining problem-solving skills through the development of their local projects as well as communication / connection skills through mentoring young summer campers and articulating their projects to their peers and community. Through these activities, specific project **outputs** (increased awareness and knowledge of fellows and community, increased awareness of youth campers, increased teaching and leadership skills, direct environmental benefit) and **outcomes** (recruitment of underrepresented groups, development of new environmental groups, community leader development, knowledge and appreciation of biodiversity) will be reached.
- (b) Environmental Priorities 2-4 will be reached proximally as a result of the implementation of student projects and distally as a more informed and engaged community mindset propagated by the leadership activities of Fellows. Given the nature of the region and the associated rich aquatic natural resources, we anticipate that several of the community projects will involve developing local water quality monitoring groups through citizen science type approaches in the context of agricultural or urban disturbance. It is also likely student projects will take the form of a low-cost restoration/rehabilitation of community natural areas (e.g., coarse woody debris addition to small streams, invasive species control from riparian zones, nature trail creation and maintenance) along with associated interpretation. Following both of these 2 examples **Priority 2** will be reached by ensuring clean and safe water through monitoring or restoration of local waterways, **Priority 3** will be reached by ensuring safety of chemicals through effective control of invasive species and trail maintenance in natural areas, and **Priority 4** – will increase transparency, public participation, and collaboration with communities through the implementation and interpretation of these projects as well as through Fellow participation in summer youth camps. Through on-the-ground activities such as these, specific project **outputs** (increased awareness and knowledge of fellows and community, increased awareness of youth campers, increased teaching and leadership skills, direct environmental benefit) and **outcomes** (recruitment of underrepresented groups, development of new environmental groups, community leader development, knowledge and appreciation of biodiversity) will be reached.
- (c) As outlined above, most of the Educational and Environmental priorities will be reached as a result of the student-led community-based environmental projects. We will focus on 6 schools, with 3 students in each. As such, five schools will be disbursed \$4167 and one school will be disbursed \$4165, for a total of \$25,000 in total subawards. Students from each school will collaborate on a problem-based service-learning environmental project at their school and/or in their local community. By their very nature these projects will be localized and collaborative, examples of which include but are not restricted to:
- Implementing a community garden and composting program
 - Starting a water quality monitoring / watershed management citizen-science group
 - Initiating a school or community waste reduction and recycling program
 - Creating or improving community natural areas through vegetation management and trail construction
 - Starting a citizen-based air quality monitoring citizen science group
- Selection of schools and fellows will follow a hierarchical approach. Multiple schools in the study area will be visited during the Fall of 2018 to highlight the project, assess environmental knowledge and interest through questionnaires and student and teacher interactions, and

recruit potential fellows. Following these visits and evaluation of questionnaires, 6 schools will be selected for inclusion in the program-based interest, need, and merit (in that order). Individual fellows will be selected based on interest and merit, particularly as it pertains to environmental knowledge and leadership potential, as determined by a short application form voluntarily submitted by interested students. After fellows from a given school are selected, mentors from Troy University will be matched with each school based on school needs and mentor background to form the best 'fit'. Each group of fellows will be required to provide a proposal and budget of their project idea to their mentor by mid-spring, which will be reviewed by the Project Coordinator and a team consisting of all mentors. This review will ensure that any project idea will address at least one educational and environmental priority of the EPA. Once this has been provided, which will occur by April, ½ of the subaward will be disbursed to the school via the appropriate administrative contact (Environmental Club sponsor, Principal, etc.). This will allow project initiation prior to the end of the school year. The second installment of funds will be disbursed by October 1 following a progress review by Project Coordinator to allow project continuation in the fall.

- (d) The sub-grant program will provide each participating school approximately \$4100 to each of 6 schools (\$25,000 total) design and implement school-based and/or community-based environmental projects. As the goal of the project is to determine how mentorship and localized environmental action increases community awareness, knowledge, and involvement, and these funds directly facilitate the design and implementation of local student-based projects, the sub-grant program is integral in attaining the project goal. The sub-award program directly addresses objective 1 (create and implement a localized environmental curriculum model and mentor 18 high school juniors ("fellows") on general and localized environmental issues) and 2 (gain hands on problem solving and teaching experiences) as, alongside faculty mentorship and residential camp, funds will be used in aiding the design of these projects. Funds will be most useful for offsetting direct material and logistics costs associated with attaining objective 3 (implement 6 high school environmental projects) and objective 4 (facilitate knowledge transfer to community). Funds will be disbursed in an incremental basis with mid-term and final progress reviewed by the Project Coordinator and mentor team to ensure funds are being used as indicated.

(4) Who

- (a) The primary target audience for LEAP is high school juniors in Black Belt counties of Alabama. By directly targeting 18 individuals in six schools in the region, we can effectively provide direct environmental experience and exposure at an opportune time to assist these individuals as they apply for college and/or provide job skills in the environmental field. These 18 individuals will lead and inspire other students and community members at their respective schools as a result of the implementation and interpretation of localized environmental projects. These projects and interpretation will expose 200-500, 9-12 grade students at each school (depending on school size) to environmental issues and problem-solving. Thus, this project will directly reach upwards of 3000 high school students in on one of the most underrepresented regions of the nation. Further, the youth day camps hosted at Troy during the intensive summer training experience will target approximately 25 5th and 6th grade students from the same region. The Black Belt region is notably underserved with high poverty, little economic opportunities, high unemployment, and limited access to services and education. Most schools in the region are at or near the bottom for the State of Alabama in terms of test performance, advanced STEM courses, and college preparation. Thus, there is a critical need in this area for advances in education, awareness of the globally-relevant natural heritage of this region, and job skills.

- (b) The recruitment plan will involve initially visiting 10-12 schools in the Black Belt region in an outreach tour geared towards engaging students in Environmental Science. Associated with this event, we will meet with individual STEM teachers to promote the LEAP program, gauge need and interest, and seek a commitment to engaging in LEAP. From these 10-12 schools, six schools will be selected (2-3 urban, 3-4 rural) based on level of commitment and performance-based needs (number of advanced STEM courses, standardized test score, number of STEM teachers, etc.). From the six schools, teacher nominations and student applications will be solicited for the LEAP program. Fellows will be selected from these nominations and applications based on interest, need, and potential.

(iii) Project Evaluation

- (1) The progress of the team will be measured by the completion of major targets every three to six months, according to the Gantt Chart. December 2018: The project coordinator should have developed the online curriculum, short-listed schools for sub-grants, decided on what project/s to carry out, and completed soliciting applications from the fellows. March 2019: Shortlisting of fellows for online curriculum, implementation of the online curriculum, and matching mentors to the fellows should be completed by March's end. Disbursement of the first half of the sub-grants should be done during this period. June 2019: Invitation for applications for youth summer camp and finalization of the camp curriculum should be complete, followed by the completion of the fellow and youth summer camps by the second quarter of 2019. Evaluation of the sub-grant projects and disbursement of the remaining sub-grant should be completed after the conclusion of the camps, at least by August 2019. December 2019: Completion of the sub-grant projects and their evaluation followed by fellow reunion before the semester ends for the year.

Educational evaluation will be made by conducting tests before and after the online classes. The first test will be conducted during the high school visits by the coordinator, while recruiting schools for the sub-grant. The second test (with the same questions) will be conducted at the end of the online curriculum to check if there is any increase in knowledge amongst the students. While the Fellows are at the Troy summer camp, they present their project ideas and lead associated activities with the youth summer campers.

The sub-grant project will be developed in consultation with the schools and will include at least one of the following: a) afforestation, b) water quality monitoring, c) recycling at school, and d) collaboration with local environmental organizations (citizen science). Progress will be evaluated by collecting before/after data in the project area to evaluate efficacy, quantifying pre/post project attitudes and knowledge of students via questionnaire, and soliciting feedback from environmental organizations in collaboration with the school for citizen science. A social networking page will be maintained where everyone involved in the project will be able to communicate, collaborate, post pictures, and provide updates.

- (2) The medium-term outcomes will be evaluated by successful completion of the project, involvement of the students in citizen science, and their ability to discuss environmental issues at the reunion. Long term outcomes can be evaluated by higher enrollment in colleges in STEM subjects and continuation of community projects annually after the project period is over.
- (3) Based on the total budget and the Gantt Chart, a short term detailed budget will be made for every six-month period detailing the cost of every task to be conducted during that period. For the sub-grants, the amount per school/school district will be decided by the project coordinator after determining the need for schools involved and the project/s to be conducted. Approximately 50% of the assigned amount will be given while mentoring is in progress, and the remaining balance will be given after the completion of the summer camp and evaluation of the project progress. This is done to ensure participation from the students in the mentoring process and in the summer camps, as well as to monitor the expenditure incurred with the sub-grants.

DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)

(b) Detailed budget and narrative

(i) See detailed budget table below.

	EPA Funds	Non-EPA Funds	Total
a. Personnel			
Faculty Mentors	\$0	\$19,350	\$19,350
Graduate student	\$4,800	\$0	\$4,800
Project coordinator	\$21,600	\$0	\$21,600
Curriculum/Camp coordinator	\$0	\$10,800	\$10,800
TOTAL PERSONNEL	\$26,400	\$30,150	\$56,550
b. Fringe Benefits			
Benefits	6048	\$8,442	\$14,490
Grad student benefits	\$367	\$0	\$367
TOTAL BENEFITS	\$6,415	\$8,442	\$14,857
Total Labor costs	\$32,815	\$38,592	\$71,407
c. Travel	\$6,038	\$0	\$6,038
d. Equipment	\$0	\$0	\$0
e. Supplies	\$3,209	\$3,750	\$6,959
f. Contract Costs	\$0	\$0	\$0
g. Construction	\$0	\$0	\$0
h. Other			
Room & board	\$7,326	\$0	\$7,326
Other (Subawards)	\$25,000	\$0	\$25,000
TOTAL OTHER	\$32,326	\$0	\$32,326
Total Contracts, Travel, Equipment, Supplies, Other costs	\$35,535	\$3,750	\$39,285
Subtotal Cost	\$41,573	\$3,750	\$45,323
i. Total Direct Charges	\$74,388	\$42,342	\$116,730
Indirect Charge #1 (Personnel)	\$10,230	\$0	\$10,230
Indirect Charge #2 (Travel, supplies, other)	\$15,382	\$0	\$15,382
j. Total Indirect Charges	\$25,612	\$0	\$25,612
k. Totals	\$100,000	\$42,342	\$142,342

(ii) The minimum 25% match will be provided in the form of salaries by the Department of Biological and Environmental Sciences at Troy University through 2 weeks of summer salary for 6 faculty mentors and hiring of the curriculum/camp coordinator. Faculty match will amount to a half month's salary for six faculty members i.e. $\$6,450 \times 6 \text{ faculty} \times 0.5 \text{ months} = \$19,350$ and benefit of $\$19,350 \times 28\% = \$5,418$. The camp coordinator will be paid $\$1,800 \times 6 \text{ months} = \$10,800$, along with benefits at 28%, amounting to \$3,024. This total match will amount to 27.8% of the total costs.

(iii) The sub-awards totaling \$25,000 will be distributed among the six schools from where the fellows will be recruited. On average, it is estimated each school will get \$4,167; however, the actual amount may fluctuate between \$3,000–5,000 depending upon the need of the school. As needed funds will be spent on upgrading or adding resources that will benefit the students, such as stocking books in the library, providing access to online libraries, or purchasing supplies such as soil/water testing kits, etc., while the majority will be spent on implementing community projects such as afforestation, clean-up of

trashed areas both terrestrial and aquatic, implementation of recycling at school, and collaboration with local environmental organizations. Areas of expenditure will include transportation, refreshments, purchasing supplies such as recycling bins, equipment used for training of the students, and for collection of data as a part of the citizen science initiative, which will be supplied to the organizations they are collaborating with, etc.

(iv) Federal funds will be used for the hiring of a Project Coordinator and graduate student support and associated fringe benefits, travel associated with recruitment, mentoring, summer camps, and post-summer follow ups, material supplies, room and board for Fellows during their 2-week camp, sub-awards to partnering schools, and indirect charges (37% of non-student expenses). The non-federal match will include salary to offset time spent by the faculty to mentor Fellows, finalize the curriculum, and support the camps. Non-federal Departmental match will also fund a camp coordinator for six months from January to June 2019 to manage camp-related activities and decisions.

(v) **Personnel:** This project will start with the hiring of a project coordinator, who will be employed for 12 months and coordinate mentors/activities/projects. It is estimated that his/her salary will be \$21,600 ($\$1,800 \times 12$ months) and benefits will be \$6,912 (25% of \$21,600) respectively. A graduate student will also be involved to provide support to the summer camps for three months. His/her salary and benefit will total \$5,170 ($\$1,600 \times 3$ months = \$4,800 + 7.7% of \$4,800 = \$370). A camp coordinator and Troy University faculty members will be involved in the project for six months and three months respectively and their salary and fringe benefit will be the match amounting to \$38,952. The total personnel cost, including both federal and match amounts to \$72,274. Potential University faculty participating in the project include Dr. Siegfried Harden, Ms. Elizabeth Ensor, Mr. Jonathan Miller, Dr. Alvin Diamond, Dr. Carrie Miller, and Ms. Chelsea Smith.

Travel: This will include travel by the project coordinator and mentors for recruitment and mentorship. Round trips to the schools are estimated to be about 100 miles. Eight schools will be targeted and 6 will be chosen for the sub-grant projects. During recruitment the schools will be visited twice by the project coordinator, a faculty and graduate mentors, and an undergraduate liaison. The travel cost for recruitment is estimated at 1600 miles \times \$0.545 = \$872. Total per diem cost of recruitment will be 3 people \times 8 schools \times 2 times \times \$51 = \$2,448. A faculty/graduate mentor and undergraduate liaison will travel to the six schools for direct mentorship once every month. The travel cost for mentoring will be 600 miles \times 4 months \times \$ 0.54 = \$1,308, while the total per diem cost will be 2 individuals \times 4 schools \times 4 months \times \$51 = \$1,224. A field trip to a local biodiversity hotspot during the summer camp for the Fellows will cost \$33 for travel (60 miles \times \$0.545) and \$153 per diem (3 mentors \times \$51). Travel costs total \$6,038.

Supplies: Materials in the form of consumables such as gardening tools, landscaping supplies, water chemistry kits, hardware, educational materials, and camp supplies will be needed. Federal requests for supply costs are \$3209. We anticipate generating \$3,750 from summer youth camp ($\$150 \times 25$). We will use these funds for youth day camp supplies/materials/ and to offset any other incidental expenses associated with the camp. These generated funds will result in no net profit but will serve to sustain the day camp and only enhance the broader LEAP project.

Other: Sub-award of \$25,000 will be awarded to six schools to initiate community projects. An amount of \$7,326 will be used towards dining ($\$223 \times 18$ fellows = \$4,014) and housing ($\184×18 fellows = \$3,312) of the Fellows during summer camp at Troy University dormitories. The expenditure under this head totals \$32,326.

Indirect Cost: All non-student salary, fringe, travel, supplies, and subawards will have 37% indirect charges applied. This is in accordance to the federally agreed rate for Troy University. Indirect charges are \$10,230 for personnel and \$25612 for travel, supplies, and other, totaling \$25612.

DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)

(c) Appendices

(i) Time line of proposed tasks.

	2018				2019												2020	
Task	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
Hire coordinator(s)																		
Curriculum development																		
Visit high schools/recruit/test																		
Solicit Fellow applicants																		
Screen Fellow applicants																		
Select and notify Fellows																		
Match mentors/liaisons to Fellows																		
Initiate curriculum																		
Disburse sub-grants to Fellows' schools																		
Fellow summer camp development																		
Youth summer camp development																		
Advertise youth camp																		
Fellows' summer camp																		
Youth summer camp																		
Team assessment																		
Implement community projects																		
Fellow 'reunion'																		

DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)

(ii) Logic Model

INPUT (personnel)	ACTIVITY (what will we do?)	OUTPUT (direct results)	OUTCOME (short-term, specific)	IMPACT (long-term, broad)
<ul style="list-style-type: none"> Existing community network (Troy University) Existing camp network (Troy summer camps) Educational capital (Troy mentors) Regional secondary schools (Env. Sci. & Biology teachers) 	<ul style="list-style-type: none"> Create / Implement 9-week curriculum model for fellows Mentor fellows Host intensive summer camp for fellows Implement fellows' summer projects Conduct youth environmental camps and festival Facilitate knowledge transfer to fellows' community 	<ul style="list-style-type: none"> Increased awareness and knowledge of fellows and community. Increased awareness and knowledge of youth campers Increased teaching and leadership skills (fellows, mentors, and undergrads) Direct environmental benefit 	<ul style="list-style-type: none"> Recruitment of underrepresented groups into environmental studies Development of new local and school-based environmental groups Future community leader development Knowledge and appreciation of regional diversity 	<ul style="list-style-type: none"> Increased knowledge base of environmental issues Elevated environmental awareness, access to resources, and sense of place for all citizens Increased protection of natural resources Green behavior and stewardship

DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)

(iii) The Department of Biological and Environmental Sciences is a diverse department within the College of Arts and Sciences at Troy University in Troy, AL. Departmental faculty possess a broad range of expertise, including organismal botany and zoology, marine biology, genetics, environmental biogeochemistry, freshwater ecology, and environmental restoration and sustainability. The Department serves approximately 400 undergraduate and 40 graduate students and has an active Environmental Club that currently has a distribution list of approximately 200 students. Pertinent facilities associated with the Department include The Arboretum, a lodge-style classroom facility situated on a wooded 75-acre natural area with native flora of Southeast Alabama and associated aquatic habitats, all accessible by trails and suitable for outdoor learning. Other pertinent facilities include a Departmental Greenhouse and the Herbarium, which houses over 40,000 specimens of vascular plants, bryophytes, and fungi.

All programmatic administrative decisions, duties, and issues will be handled by the PI. Dr. Helms has extensive experience, as part of the Auburn University Museum of Natural History (AUMNH), leading tours, camps, mini-courses, and teacher education modules to school groups, scouting troops, general public, University administration, Departmental/University visitors, resource managers, and potential donors. Beyond hosting tours and open houses, he routinely visits area schools, environmental groups, and prisons to promote biodiversity. He has worked closely in the past with university outreach to coordinate summer science camps, single-day mini-courses, and teacher education. He was recently a Mentoring Scientist on an NSF-funded initiative (STEM-IQ) focused on increasing participation and training area middle schools and high schools for regional science fairs, which involved participating in summer teacher training workshops, visiting local schools and training students and teachers, and judging regional science fairs. He also routinely serves as a judge in student robotics fairs, Science Olympiad, and at national meetings. Dr. Helms has a history of receiving and successfully implementing and administering externally-funded primary and applied research, and currently is funded by NSF, EPA, DoD, and the State of Texas through sub-contracts with Auburn University (see resume p15). All tasks and associated interim reporting have been completed for these projects. This current proposal would be his first externally funded assistance agreement performed at Troy University.

Below are examples of agreements similar in scope and relevance that have been performed by other faculty within the Department of Biological and Environmental Sciences at Troy University within the past 5 years.

“The Greater Alabama Black Belt Region--Recruitment and Retention of Minority Students in STEM”
National Science Foundation, Louis Stokes Alliances for Minority Partnerships. \$79,059. Nov 2016

The Greater Alabama Black Belt Region (GABBR) LSAMP, to be called the GABBR Alliance, is a collaborative effort involving a diverse mix of stakeholders (see Report to the President, Engage to Excel: Producing One Million Additional College Graduates with Degrees in STEM, 2012), including eight universities and colleges: Alabama State University (ASU), Auburn University (AU), Auburn University Montgomery (AUM), Enterprise State Community College (ESCC), Southern Union State Community College (SUSCC), Troy University (Troy), Tuskegee University (TV), and University of West Alabama (UW A); state partners: Alabama Black Belt Commission and GEAR-UP Alabama; and national laboratories: Brookhaven National Laboratory and Oak Ridge National Laboratory. Two of the participating institutions, ASU and TU are leading Historically Black Colleges and Universities (HBCUs) while UWA is a minority serving institution. GABBR encompasses seventeen counties in the Alabama Black Belt (Barbour, Bullock, Butler, Choctaw, Crenshaw, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Montgomery, Perry, Pike, Russell, Sumter, Wilcox) and three surrounding counties (Coffee, Dale, and Lee). The Alliance goals are to (1) increase the quantity and quality of underrepresented minority (URM) STEM degrees, (2) increase the quantity and quality of underrepresented minority undergraduates (URMs) entering graduate school, and (3) investigate and disseminate the GABBR LSAMP model's impact on recruitment, retention, success and graduation of target students from a social science research perspective. In this regard, URM will mean African American, Hispanic or Latino, Native American, and Pacific Islander.

All tasks and associated reporting have been completed in a timely manner for this work.

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“Pike County Groundwater Festivals”

Legacy Partners in Environmental Education; AL Department of Environmental Management; Choctawhatchee, Pea and Yellow River Watershed Management Authority; City of Brundidge; City of Troy; \$4,500. Feb 2016-2018

The Pike County Groundwater Festival provides environmental education and activities for 4th grade students In Pike County, Alabama. An estimated 540 students, teachers, and administrators from all public, private, and home-schools in the county are invited to attend educational activities on the campus of Troy University during the spring.

All tasks and associated reporting have been completed have been completed in a timely manner for this work.

“Earth Week: Troy and Troy City Recycling, Big Bend Wildlife Sanctuary, Montgomery Zoo, Native Species Plants and Animal Identifications.” Legacy Partners in Environmental Education. \$300. Feb 2016

Information booth with club members from the Troy University Environmental Club set up on the Quad at the Troy campus. At the booth, we give out reusable grocery shopping bags to offer an alternative to the one-time-use plastic bags. We have plant and animal identification games at the booth for participants to attend. We give out recycling bags that can be used throughout the city at recycling trailers. The Environmental Club decorates clay pots for attendees to use for potting plants. We have a nature photo contest for students. The photos are displayed at the booth for attendees to vote on their favorites. We offer t-shirt tie-dyeing to encourage students to come by and spend some time at the booth. We provide educational materials to attendees on recycling, both on-campus and for the city of Troy. We have educational talks at the booth featuring rescued wildlife from Big Bend Wildlife Sanctuary. We have representatives from the Montgomery Zoo present information about the roles zoos can play in promoting biodiversity and appreciation of the natural environment. We will have games involving identification of native plants and animals. We plan to have a documentary film showing that will increase awareness of environmental issues facing Alabama's rivers. We normally have over 100 students, faculty, and staff will come to the booth each day to participate in one or more of the activities.

All tasks have been completed have been completed in a timely manner for this work. No reporting was required.

Brian Helms, Ph.D. - RESUME

210K, MSCX, Troy University, Troy AL 36082

Phone: 334-670-3932; Email: helmsb@troy.edu

Professional Preparation

1995 North Carolina State University, Biology, B.S; Zoology, B.S.

2000 Appalachian State University, Biology, M.S.

2008 Auburn University, Biological Sciences, Ph.D.

Professional Appointments

2017-present Assistant Professor, Biological and Environmental Sciences, Troy University

2014-2017 Assistant Research Professor, Biological Sciences, Auburn University

2008-2014 Invertebrate Collection Manager, Auburn University Museum of Natural History

2000-2002 Assistant Conservation Officer, North Carolina Botanical Garden, Biological Sciences, University of North Carolina at Chapel Hill

Recent publications (*Undergraduate researcher)

1. **Helms, BS**, N. Bickford, N. Tubbs*, J. Feminella. 2018. Feeding, growth, and trophic position of redbreast sunfish (*Lepomis auritus*) in watersheds of differing land cover in the lower Piedmont, USA. Urban Ecosystems.
2. Clay*, M., J. Stoeckel, **B. Helms**. 2017. The role of abiotic and biotic cues in terrestrial navigation of burrowing crayfish. Behaviour 154: 1177-1196.
3. **Helms, B**, J. Zink, D. Werneke, T. Hess*, Z. Price, E. Brantley, and G. Jennings. 2016. Development of Ecogeomorphological (EGM) Stream Design and Assessment Tools for the Piedmont of Alabama, USA. Water 8, 161; doi:10.3390/w8040161.
4. **Helms, B.**, R.C. Vaught*, S.K. Suciu*, and S.R. Santos. 2015. Cryptic diversity within two endemic crayfish species of the Southeastern US revealed by molecular genetics and geometric morphometrics. Hydrobiologia. 755: 283-298
5. Simpson*, A., I. Turner, E. Brantley, and **B. Helms**. 2014. Bank erosion hazard index (BEHI) as an indicator of near-bank macroinvertebrate assemblage structure in a southeastern Piedmont stream. Ecological Indicators 43: 19-28.
6. **Helms, B.S.**, Z. Loughman, B. Brown, and J. Stoeckel. 2013. Recent advances in crayfish biology, ecology, and conservation. Freshwater Science 32: 1273-1275.

Current Grants and Funding

1. US EPA – 104(b) Wetlands Program Development Grant. “Establishment of Wetland Reference Sites in Alabama” (Co-PI). \$229,452
2. NSF – RAPID. “Aquatic refuge and recovery in the face of drought in a biodiversity hotspot”. (Co-PI). \$171,000.
3. Texas Comptroller of Public Accounts – Texas State University. “Conducting Captive Propagation applied research on candidate mussel species in both the Colorado River and Brazos River basins”. (Co-PI). \$421,000
4. US DoD – Strategic Environmental Development and Research Program. “Evaluating the long term ecological responses to riparian ecosystem restoration at the Fort Benning, GA Military Installation.” (Co-PI). \$249,896

DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)

(iv)

Department of
Biological &
Environmental
Sciences

213 McCall Hall
(MSCX)
Troy, Alabama
36082

334-670-3401
334-670-3626 FAX



10 April 2018

Dear Dr. Helms:

I am in support of the proposed project "DEEP SOUTH STUDENT LEADERSHIP and ENVIRONMENTAL ACTION PROGRAM (LEAP)" to be submitted to the Environmental Protection Agency Office of Environmental Education for funding opportunity EPA-EE-18-04 ("Environmental Education Local Grants Program for Region 4"). This project fits within the scope and capabilities of the Department of Biological and Environmental Sciences at Troy University. The Department will provide in-kind match of \$38,592 (26.7% of total). This is comprised of \$30,150 in salaries to support faculty mentors and a part time Curriculum/Camp coordinator, along with \$8,442 in associated fringe benefits. This match exceeds the minimum 25% match required by the solicitation.

Sincerely,

A handwritten signature in dark ink, appearing to read "SB Harden".

Siegfried Harden, PhD
Associate Professor and Chair
Department of Biological and Environmental Sciences
Troy University
Troy, AL 36082

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1-334-670-3401

